

and was abandoned by the crew. The *Nelson* left Astoria on November 3, and southeast storm warnings were displayed at all stations at the mouth of the Columbia River when the vessel put to sea. The captain reports encountering a severe storm on the night of November 4, which increased in energy and finally resulted in wrecking his vessel.

On November 9, the schooner *C. A. Thayer* went ashore at the entrance to Grays Harbor during the gale of that date. A gale of 90 miles an hour from the southeast occurred at North Head on the morning of the 9th. The masters of incoming vessels all report having experienced gales of hurricane force near the American coast, which did much damage in carrying away masts, rigging, hatches, lifeboats, etc. With the exception of the *Charles Nelson*, however, the disasters caused by the storms were almost exclusively confined to inward-bound shipping.

The forecasts for this district were made by District Forecaster Edward A. Beals from the 1st to the 5th, inclusive, and by Observer A. B. Wollaber during the remaining days of the month.—A. B. Wollaber, Acting District Forecaster.

RIVERS AND FLOODS.

No floods of consequence were reported during the month, and there was but a single stage above a danger line recorded, namely at Red Bluff, Cal., where a stage of 24.5 feet, 1.5 feet above the danger line was reached as a result of exceptionally heavy rains that lasted from the 19th to the 22d, inclusive, and amounted to about 5.50 inches. Warnings were issued on the 20th, advising the removal of live stock and care of the levees.

The stages of the Mississippi River, like those of the corresponding period of the preceding year, were above the average for the season below the mouth of the Missouri River, and they were also higher above the mouth of the Ohio River than during October. The Missouri River changed but little, while the Ohio was higher. The Tennessee was too low for navigation, except for the week from the 18th to the 24th, inclusive, and at the close of the month 85,000 cross-ties were lying on the bank of the river at Florence, Ala., awaiting sufficient water for shipment.

Floating ice was observed in the Mississippi River at St. Paul, Minn., on the 18th, reaching Hannibal, Mo., on the 25th, and continuing until the 30th. The Missouri River at Bismarck, N. Dak., froze over on the 17th. Floating ice had previously been seen as early as the 13th. The ice reached Pierre, S. D., on the 15th, and closed the river on the 18th. Running ice was observed at Sioux City, Iowa, from the 17th to the 19th, inclusive, and the river gage was frozen in on the former date.

The James River, Northwest, also froze over on the 17th, while the Red River of the North, at Moorhead, Minn., closed on the morning of the 27th. The Penobscot River, at Mattawamkeag, Me., closed on the 26th; the Merrimac, at Concord and Manchester, N. H., on the same date. The ice went out

two days later, however, at the latter place. The Connecticut River at Wells River, Vt., froze over on the 21st, and floating ice was quite plentiful at all points below, forming a small gorge above the bridge at Hartford, Conn., on the 28th.

The departure on the 30th of the steamboat *Dean Richmond*, from Albany, N. Y., marked the close of through navigation for the season on the Hudson River.

At the end of November, 1902, very little ice had been observed in the various rivers.

The highest and lowest water, mean stage, and monthly range at 183 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock on the Arkansas; and Shreveport, on the Red.—H. C. Frankenfield, District Forecaster.

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	2, p. m.	54	114	9, p. m.	39	75	Miles. 3,050	Days. 7.0	Miles. 436	Miles. 18.1
II.....	8, a. m.	43	123	10, a. m.	35	85	2,150	2.0	1,075	44.8
III.....	12, p. m.	51	114	15, p. m.	35	76	2,450	3.0	816	34.0
IV.....	16, a. m.	54	114	22, a. m.	46	60	3,775	6.0	629	26.2
V.....	25, a. m.	50	97	28, a. m.	28	83	1,900	3.0	633	26.4
VI.....	28, a. m.	51	114	*1, a. m.	37	81	2,575	3.0	858	35.8
Sums.....							15,900	24.0	4,447	185.3
Mean of 6 paths.....							2,650		741	30.9
Mean of 24.0 days.....									662	27.6
Low areas.										
I.....	4, a. m.	48	89	6, a. m.	46	60	1,500	2.0	750	31.2
II.....	5, p. m.	41	70	8, a. m.	46	60	725	2.5	290	12.1
III.....	6, p. m.	54	114	10, p. m.	48	68	2,800	4.0	700	29.2
IV.....	9, p. m.	54	114	11, p. m.	48	86	1,800	2.0	900	37.5
V.....		43	109				1,700		850	35.4
VI.....	11, a. m.	47	123	13, a. m.	35	97	2,275	2.0	1,136	47.3
VII.....							1,900		950	39.6
VIII.....	14, a. m.	47	123	17, p. m.	48	68	3,100	3.5	886	36.9
IX.....	21, a. m.	48	125	25, a. m.	50	64	3,050	4.0	762	31.8
X.....	23, p. m.	37	117	25, p. m.	30	82	2,250	2.0	1,125	46.9
IX.....	27, a. m.	54	114	30, a. m.	42	80	2,225	3.0	742	30.9
					47	65	3,375		1,125	46.9
Sums.....							26,700	25.0	10,216	425.7
Mean of 12 paths.....							2,225		851	35.5
Mean of 25.0 days.....									1,068	44.5

* December.

For graphic presentation of the movements of these highs and lows see Charts I and II.—George E. Hunt, Chief Clerk, Forecast Division.

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions during November are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

Alabama.—The first half of the month was warm and favorable, but the latter half was much colder than the average. The rainfall was deficient, particularly in the central counties. A severe cold wave on 19th damaged recently sprouted wheat and oats and fall gardens, and killed some very late cotton on lowlands; cotton mostly marketed. About an average acreage of wheat and oats indicated, early sown doing well.—F. P. Chaffee.

Arizona.—Rainless weather prevailed throughout the entire month,

making, with the rainless weather of the greater portion of October, an exceptionally long dry spell. Temperatures averaged above normal. There was an abundance of feed on ranges, due to the good rains of the latter part of September, and this was well cured as hay by the dry weather. Stock was in excellent condition, but the supply of water was diminishing, causing fear of suffering unless rain came soon.—M. E. Blystone.

Arkansas.—The unusually cool and dry weather was favorable for gathering outstanding crops, but was too dry for plowing, seeding, and germination. Cotton picking well advanced, probably 80 per cent completed; the yield was light. Corn all gathered; yield average. Irish and sweet potatoes made good crops, and harvesting was nearly completed. Less than usual acreage sown to small grain. Pastures dried up and stock water was scarce, but an abundance of winter feed was secured and stock was generally thrifty.—Edward B. Richards.

California.—Weather conditions were nearly normal during the month,

except in Southern California, where a marked dry period prevailed. Heavy rains fell in the central and northern portions of the State, causing a rapid growth of grass and early sown grain, and softening the soil for cultivation. Nearly all crops were under cover before the beginning of the rains. Heavy frosts occurred toward the close of the month, but caused no material damage.—*Alexander G. McAdie.*

Colorado.—Conditions were unusually favorable for finishing the harvest of the few outstanding crops. There was a pronounced scarcity of precipitation, and plowing, seeding, and germination were prevented by the dryness. Over the eastern ranges the low temperatures of the 16th to 20th caused some shrinkage in live stock, but otherwise conditions were favorable, and at the close of the month cattle, horses, and sheep were reported as being in prime condition, excepting along the eastern foothills, where the ranges were poor. In parts of the southeastern quarter the supply of stock water was low.—*F. H. Brandenburg.*

Florida.—Frosts were frequent, general, and severe during the month. On the 27th and 28th freezing weather prevailed over half of the State, and unprotected products such as vegetables and cane were damaged. Some exposed oranges in the north and north-central portions were reported frosted, and some tender growth was slightly damaged. As a whole, the orange crop suffered no material damage. At the close of the month rain and warmer weather were needed.—*A. J. Mitchell.*

Georgia.—The first half of the month was comparatively mild, but the latter part was unseasonably cold. The precipitation for the State at large was slightly under the usual amount, but it was above the average in the southern section. The severe weather during the latter part of the month destroyed all late cotton, although the bulk of the crop was secured before that time. Seeding wheat, oats, and rye continued under generally favorable conditions.—*J. B. Marbury.*

Idaho.—Temperature averaged somewhat above normal over most of the State; precipitation averaged slightly above normal; heavy snow fell at high elevations, and some in the valleys, from the 8th to the 16th; much of this snow melted later in the month. Considerable plowing was done. Winter range was generally good at the close of the month, and stock was in fair to good condition. Hay was in good demand.—*S. M. Blandford.*

Illinois.—As the husking and garnering of corn proceeded the quality was found to be very uneven. A considerable quantity was soft and sappy, and complaint was also made of chaffy condition and light weight. Wheat was not generally in a thrifty state, the lack of moisture having retarded seasonal growth. Pasturage was short and meadows were affected by droughty conditions. Apples and potatoes in storage were not keeping well.—*Wm. G. Burns.*

Indiana.—There were several abnormally warm days during the early part of month, but cold periods occurred on the 6th to 7th, 17th to 19th, and 24th to 30th. Precipitation was about half the normal amount. Good progress was made in cribbing corn; yield below average. On account of dryness wheat was small, in many fields stand poor and some damaged by flies. There was a light covering of snow on the ground throughout State at the end of the month.—*W. T. Blythe.*

Iowa.—November was very dry, with normal temperature and no severe storms. The weather was very favorable for harvesting the corn crop, the bulk of which was cribbed in good condition, though the cobs contained more than the usual amount of moisture. Fall wheat and rye (acreage small) do not show material injury from low temperature and dry weather. The fall has been unusually favorable for stock feeding and usual farm operations.—*John R. Sage.*

Kansas.—The wet weather of the first few days of the month greatly benefited the seed wheat in the ground and the growing wheat; the dry weather following was very beneficial to corn gathering. Wheat was in good condition and growing, except that the early wheat was damaged by the fly in Clay and Ottawa counties, and in some fields in Sedgwick; it was being pastured in Kingman. Corn dried out well and much was gathered. Cattle were in good condition.—*T. B. Jennings.*

Kentucky.—The first half of month was warm, with abundant rainfall, but the latter part was quite cool and dry. Wheat, oats, and rye made good growth during the early part of the month, but the cold dry weather which followed checked their growth, and they went into the winter in only fair condition. No reports of damage by the Hessian fly have been received. Very few sudden changes in temperature occurred and no damaging conditions prevailed. Fruit trees appeared to be doing well.—*H. B. Hersey.*

Louisiana.—An unusually severe drought prevailed during the month which, following a marked deficiency in precipitation, made it impossible to complete fall plowing and planting. The unprecedented early freeze, November 19, 1903, with temperatures of 22° to 29° in the sugar region, killed sugar cane except on the immediate coast. Warnings issued by the Weather Bureau on the 17th and 18th, advising planters to prepare for temperatures of 27° to 30° on the 18th, and 25° on the 19th, were heeded generally. Sugar cane to the value of about \$2,000,000 was windrowed and protected through the freeze. The cane crop was giving a very light tonnage, but a good sugar yield was reported. Grinding was suspended while the crop was being windrowed, but good progress was reported. Cotton was about all gathered. Corn was housed in good condition.—*I. M. Cline.*

Maryland and Delaware.—Low temperature and insufficient rainfall

hindered all growth. Wheat suffered most from these inclemencies and was very backward; early sown wheat was in fairly good condition, though short, but late wheat was poor. The dry weather favored the curing of corn and tobacco. Corn husking nearly completed; the quality of the fodder was good. Pasturage was short. The soil was in bad condition, and plowing not well advanced.—*Oliver L. Fassig.*

Michigan.—The weather during November was generally cool and dry, and forwarded sugar beet harvest and corn husking, but retarded the growth of winter wheat and rye. The wheat and rye were sown rather late this year and germinated finely. Wheat rooted well and at the end of the month looked healthy, but was rather small. A few correspondents reported Hessian fly in wheat, but this condition was not general.—*C. F. Schneider.*

Minnesota.—November opened warm, with such hardy plants as clover and sweat peas still green. After the 5th there was a gradual fall in temperature, which reached zero in northern portions the first time this season on the 17th, and in southern portions on the 26th. Nearly all the precipitation of the month occurred after the 8th, and it was practically all snow. Sleighing was general in the north on the 23d, but in the south there was not enough snow to cover the ground. Shallow lakes in the south were frozen over on the 15th, and they continued closed with ice. The Mississippi was covered with ice heavy enough to stop the Minneapolis saw mills on the 17th. There was a cold wave on the 24th. Plowing was generally stopped before the middle of the month; thrashing was nearly finished, and corn husking was progressing satisfactorily at the end of the month.—*T. S. Outram.*

Mississippi.—The fore part of the month was unusually warm, and the latter part very cool with unprecedentedly low temperatures for November. The drought which prevailed over the greater portion of the State during September and October continued unbroken. The freeze on the 19th injured sugar cane in the southern portion of the State. Cotton picking was about completed, except in a few Delta counties, where there remained in the fields from one-fourth to one-third of the crop; the yield was considerably below the average. Fall crops were a total failure and little or no fall plowing or seeding was done. Stock water was very scarce. Forest fires were numerous.—*W. S. Belden.*

Missouri.—November was cool and exceptionally dry. In the eastern and southern counties wheat made little growth, and in localities looked very unpromising. In some of the southern counties much of that sown during the latter part of October was not up at the close of November. In the northern and western counties, however, the crop was generally reported in good condition. Corn gathering progressed favorably and was about two-thirds completed at the close of the month.—*A. E. Hackett.*

Montana.—The month was mild until the 7th, then quite cold, with intermittent snows, until the 19th; during the remaining days the temperature was moderate and the snowfall very light. Stock suffered somewhat during the period of cold, snowy weather, but not to any great extent, and the snow will prove much more of a benefit than a detriment.—*Montrose W. Hayes.*

Nebraska.—Rain on the first four days of November was very beneficial to winter wheat and placed soil in western counties in condition for seeding, and considerable wheat was sown. Wheat in eastern counties was in good condition, but made a rather short growth; in western counties some wheat was not up and much was very small. The dry weather with moderate temperature which followed the rain was very favorable for completing fall work. Corn husking progressed rapidly and from one-half to two-thirds of the crop was generally secured by the end of the month.—*G. A. Loveland.*

Nevada.—The weather of the month was moderately mild and generally favorable for stock and for the farm work usual at this time of the year. High winds from the 11th to 15th did more or less damage to trees, fences, and farm property in various parts of the State. Winter range feed rather poor; live stock in fair condition generally.—*J. H. Smith.*

New England.—Excepting November, 1894, the month was the coldest of its name in the history of the New England section. Climate and crop service. The first week was exceptionally warm and the last unusually cold. There was a marked deficiency in the precipitation, which resulted in very low water in streams and ponds; water power mills shut down for want of water and in parts of Maine farmers were much inconvenienced by the low water in wells, springs, and streams.—*J. W. Smith.*

New Jersey.—Wheat, rye, and grass sown early obtained a promising stand; that sown from two to four weeks later than usual (principally in southern section) was very poor. The severe freezing weather retarded germination and some field were bare. Pastures continued good up to close of the month. Husking of corn was about completed, yield generally below the average.—*Edward W. McGinn.*

New Mexico.—Hardly a trace of precipitation excepting on mountain ranges, since last of September. Food and water very short on stock ranges, but owing to open weather thus far and the excellent curing of what grass there was stock generally was in very good condition. Water in wells and streams was also very low.—*R. M. Hardinge.*

New York.—Wheat and rye generally covered with snow; good growth especially of the early sown and all in good condition; acreage less than expected. Favorable weather for farm work during first half of month; latter half cold with frequent snows.—*R. G. Allen.*

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and

lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Summary of temperature and precipitation by sections, November, 1903.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	51.1	-2.6	Evergreen	85	14	Riverton	12	19	2.12	-1.46	Dothan	5.79	Selma	0.17
Arizona	55.7	+2.1	Fort Deposit	85	15	Valleyhead	12	27	0.00	-0.74		0.00	55 stations	0.00
Arkansas	47.6	-3.0	Aztec	91	6	Fort Defiance	8	18	0.64	-3.42	Paragould	1.85	Texarkana	0.00
California	55.2	+1.5	Amity	89	13	Witt Springs	2	18	5.03	+2.36	Branscomb	37.17	35 stations	0.00
Colorado	37.1	+2.2	Lake Village	96	26	Bodie	5	26	0.30	-0.31	Breckenridge	2.29	7 stations	0.00
Florida	62.6	-1.8	Elsinore	96	15	Breckenridge	-17	18	2.66	+0.53	Pensacola	11.46	3 stations	T.
Georgia	51.9	-2.2	Gilby	91	8	Middleburg	17	28	2.49	-0.33	Blakely	6.85	Naylor	0.30
Idaho	36.3	-2.0	Holly, Lamar, Wray	93	1	Diamond	11	27	2.81	-1.63	Murray	7.19	Blackfoot	0.47
Illinois	38.2	-2.9	Albany	88	2	Soldier	-18	17	1.06	-1.72	Cobden	2.22	Carrollton	0.28
Indiana	38.4	-2.9	Blue lakes	79	2	Lanark	2	27	1.82	-0.85	Huntington	3.55	Mount Vernon	0.51
Iowa	34.2	-0.1	Garnet	79	3	Valparaiso	2	27	0.52	-0.85	Allerton	1.74	7 stations	T.
Kansas	41.8	-0.1	Centralia	85	2	Andubon	-5	26	0.97	-0.04	Pleasanton	2.28	Pratt	T.
Kentucky	42.5	-3.6	Winamac	79	1	Carroll	-5	18	3.01	-0.99	Hopkinsville	4.53	Bowling Green	1.21
Louisiana	56.4	-2.3	Pacific Junction	76	2	Colby	-5	18	0.36	-3.54	Hammond, State Experiment Station	1.35	3 stations	0.00
Maryland and Delaware	41.0	-2.9	Viroqua	85	8	Loretto	5	27	1.19	-2.06	Deerpark, Md.	2.60	2 stations	0.56
Michigan	33.0	-2.2	Maysville	81	3	Collinston	10	19	1.89	-0.93	Houghton	5.17	Onaway	0.47
Minnesota	27.3	-0.5	Minden	94	13	Deerpark, Oakland, Md.	1	28	0.35	-0.50	Mount Iron	1.96	8 stations	T.
Mississippi	51.7	-2.9	Boettcherville, Md.	82	3	Humbolt	-10	25	1.17	-2.07	Columbus	5.51	Louisville	0.00
Missouri	40.9	-2.0	Chatham	78	1, 3	Iron River	-10	28	1.24	-1.14	Caruthersville	3.26	Shelbina	0.20
Montana	28.6	-1.5	Beardsley	75	3	Pokegama Falls	-37	26	1.29	+0.02	Troy	4.86	Glendive	T.
Nebraska	37.0	+1.2	Currie	75	25	Shocoe	10	27	0.77	+0.11	Edgar	2.74	2 stations	T.
Nevada	41.8	+3.3	Thornton	88	1	Monroe City, Sublett	2	26	0.67	-0.04	Lewers Ranch	7.26	7 stations	0.00
New England*	35.3	-1.8	Appleton City	79	3	Augusta	-39	17	2.01	-1.91	Hyannis, Mass.	6.11	Berlin Mills, N. H.	0.77
New Jersey	39.9	-3.4	Jackson	79	2	Agate	-13	18	1.26	-2.34	Cape May C. H.	2.03	Canton	0.75
New Mexico	45.2	+2.5	Halsey	79	2	Wade	4	26	1.36	-1.62	Eagle Rock Ranch	0.03	26 stations	0.00
New York	34.0	-3.5	Palisades	89	3	Wadsworth	4	26	2.06	-1.08	Vojusia	5.54	Paul Smiths	0.22
North Carolina	46.5	-3.3	Hartford, Conn.	78	4	Stratford, N. H.	-9	27	1.81	-1.44	Bryson City	4.08	Lumberton	0.35
North Dakota	25.3	+1.0	Paterson	79	4	Layton	3	26	0.26	-0.50	Portal	0.90	4 stations	T.
Ohio	37.2	-3.4	Fruitland	90	23	Winsors	-2	18	2.10	-0.98	Cadiz	4.11	Toledo	1.01
Oklahoma and Indian Territories.	47.1	-1.8	Priurose	75	4	Wells	-14	26	0.37	-1.99	Tulsa, Ind. T.	1.36	7 stations	0.00
Oregon	43.4	+0.4	Rockingham	87	4	Livville	0	28	9.87	+3.28	Glenora	24.58	Umatilla	2.02
Pennsylvania	36.9	-3.3	Mayville	78	3	Pembina	-20	24	2.18	-1.37	St. Marys	5.33	Harrisburg	0.88
Porto Rico	76.1	-3.3	Wilson	88	3	Kenton	2	20	8.07	19.12	La Carmalita b.	19.12	Bayamon	2.04
South Carolina	50.9	-3.3	Eldorado, Okla.	92	15	Pawhuska, Okla.	2	18	1.40	+1.28	Batesburg	3.17	Georgetown	T.
South Dakota	30.8	+0.4	Dayville	80	1	Wallowa	2	17	0.39	-0.12	Elk Point	1.57	2 stations	T.
Tennessee	45.3	-2.7	York	78	4	Sageertown	0	29	4.00	+0.36	Grace	8.20	Pope	2.55
Texas	57.3	-0.8	Adjuntas	97	17	Adjuntas	54	23	0.17	-2.48	Huntsville	1.44	57 stations	0.00
Utah	39.1	+0.9	Bennettsville	86	5	Cidra	54	27	0.73	-0.03	Millville	3.34	19 stations	0.00
Virginia	42.8	-4.5	Ashcroft	80	7	Clemson College	10	27	1.74	-0.93	Marion	3.95	McDowell	0.13
Washington	40.0	-0.2	Forestburg	80	7	Ashcroft	-10	18	6.31	+1.45	Clearwater	24.84	Ephrata	1.41
West Virginia	38.0	-4.5	Redfield	80	7	Forestburg	-10	26	2.46	-0.62	Pickens	4.98	Upper Tract	0.67
Wisconsin	30.0	-1.7	Ruby	80	7	Redfield	-10	19	0.95	-0.70	Sheboygan	1.79	La Crosse	0.04
Wyoming	32.1	+1.3	Silver Lake	80	7	Ruby	4	27	0.94	-0.12	Battle	6.20	Fort Washakie	0.00

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

North Carolina.—The early portion of the month was favorable for farming operations and considerable winter oats and wheat was sown. Moderate precipitation and temperatures above normal favored the growth of early sown grain. The deficiency in moisture and severe cold during the latter part of the month prevented rapid germination and the further growth of wheat. At the close of the month early sown wheat looked fairly well, but most of the late sown was not up. There were some complaints of damage by Hessian fly. Full average areas of winter wheat, oats, and rye will be sown, but the work was not completed.—*C. F. von Herrmann.*

North Dakota.—The weather was very favorable for stock on the ranges, the grass being good and not covered with snow, so that feeding was not necessary during the month. No farm work was done as the ground was frozen.—*B. H. Bronson.*

Ohio.—The first of the month was too dry for wheat in the central and

southern sections, but the crop continued in good condition in the north, and at the close of the month was well protected by snow in all sections. Corn cured well, and husking progressed fairly well. Water continued low in the south.—*J. Warren Smith.*

Oklahoma and Indian Territories.—Drought conditions were injurious to growing wheat and rye; early wheat did well, but late did not sprout over the western counties, and much was reported dead or damaged; some early wheat was pastured, but generally pasturage was cut short, an increased acreage reported; bulk of cotton crop secured, with poor to fair yields; spring plowing progressed; late potatoes poor yield; stock did well, but was largely fed.—*C. M. Strong.*

Oregon.—The weather during November was very rainy, but the temperature was mild, and no severe cold weather occurred. The rain prevented work in the field, and but little wheat was sown, especially in the Willamette Valley and southern Oregon. The mild weather was favora-

ble to grain already in the ground, and that sown in September and October germinated nicely, generally came up to good stands, and maintained a slow and steady growth. At the close of the month it was everywhere reported to be in excellent condition.—*A. B. Wollaber.*

Pennsylvania.—At the close of the month the soil was in good condition in practically all sections and frozen sufficiently deep to cause a suspension of plowing; wheat and rye ranged from medium to very good, but were generally short on account of late seeding; considerable corn remained uncut; there was but little snow in any district for the protection of grain or grass.—*T. F. Townsend.*

Porto Rico.—Heavy thunderstorms and high winds on the 23d and 24th did some damage to fruits and small crops in some localities, but, in general, the weather was favorable for growing crops and for fieldwork. The older canes commenced to arrow freely in the drier sections of the island early in the month, and near the close a few mills had begun grinding. The outlook for a good yield was very promising. The young canes were in excellent condition. Coffee picking progressed rapidly during the first half of the month under very favorable weather conditions, and at the end of the month this work was nearing completion. Several small plots of cotton were picked, and where the crop had proper care the return was very satisfactory. Some rice and corn were harvested, while other plots were in the blossoming stage. Orange shipping was active. Pastures and stock continued in excellent condition.—*E. C. Thompson.*

South Carolina.—The first six days and the middle of the second decade were warm; the rest of the month was unusually cold, with killing frost on the 7th and 8th and the first ground freeze on the 18th and 19th, after which the month remained cold, with frequent frosts and ground freezes. The precipitation was light, but evenly distributed. Oats seeding was nearly finished, but germination was slow and stands small. Wheat seeding made slow progress, and but little of that sown came up to stands. Many bolls of late cotton were destroyed in the western counties by frosts and low temperatures. The crop was picked closer than usual and picking was practically finished. The cold weather injured fall and winter truck, but was favorable for butchering hogs, making a saving of nearly one month of feeding.—*J. W. Bauer.*

South Dakota.—There was considerable cold weather after the 14th, and snows interfered locally to some extent with field farm work, but the conditions were, on the whole, favorable. There was, however, considerable corn yet in the field in the Sioux River Valley at the close of the month. Threshing was about finished. Winter rye and the very limited amount of winter wheat sown were protected by snow during the cold weather and kept in satisfactory condition.—*S. W. Glenn.*

Tennessee.—Conditions were generally favorable for gathering crops and seeding grain. Good rains fell about the first and middle of the month; otherwise it was rather dry. The second half of the month was cold. Early sown wheat was generally looking well, but much of the crop was sown late and made slow progress; the acreage is much less than last year; there was some injury by freezes. Rye and oats were doing fairly well. Spring clover was injured by the fall drought. Corn and cotton were mostly gathered.—*H. C. Bate.*

Texas.—The month was the driest November on record. Decided falls in temperature occurred on the 18th and 19th and the 27th and 28th,

giving freezing temperatures to the coast region. Conditions were exceptionally favorable for the picking of cotton. About one-eighth of the crop is still in the fields in the north portion, but elsewhere the crop is practically all picked. The freeze of the 18th and 19th killed the cotton plants, but, as there was little or no top crop, this caused very slight damage. Wheat, rye, and oats that were up at the beginning of the month continued in fair condition, but needed rain. The dry condition of the soil greatly retarded plowing and sowing. No damage was done to the sugar cane crop by the cold weather. Cutting and grinding progressed rapidly with very satisfactory results. Fall gardens, pastures, and the ranges were in need of rain.—*L. H. Murdoch.*

Utah.—Temperatures during the month were generally above normal, excepting during the latter part of the second decade, when abnormally cold weather prevailed. Precipitation was above normal over the northern half of the section, placing the soil in good condition and favoring rapid germination and growth of fall grain, which was coming up to good stands over the southern half, where, however, but little fall grain was sown; scarcely any precipitation fell and the ground was dry and hard. Stock and ranges were in good condition.—*R. J. Hyatt.*

Virginia.—Crop progress during the month was much retarded by weather conditions that were both colder and drier than normally. Early sown winter grain was not materially injured on account of its more advanced stage of growth, but the late seeding of wheat, oats, rye, and clover was damaged, especially on wet soils.—*Edward A. Evans.*

Washington.—The month was one of heavy rainfall in the western section and an unusual amount of rain and snow fell in eastern section. The first decade was warm, the second decade cold with heavy frost and considerable snow, while the third decade was moderately warm. On account of much stormy weather, the month was unfavorable for farm work, but it was beneficial to the growth of fall sown wheat. Late crops were mostly gathered in all districts.—*G. N. Salisbury.*

West Virginia.—The dry weather, followed by the freezing temperatures with no snow protection during the latter half of the month, was very unfavorable for the growth of winter wheat, rye, and oats, and at the close of the month they were in poor condition. The acreage of wheat sown was not as large as usual. Stock was generally in good condition and feeding began earlier than usual. Some corn was still in shock, and the prospects were for a better crop than had been expected. It was too dry for turnips.—*E. C. Vose.*

Wisconsin.—The month was generally fair and pleasant during the first ten days with temperatures above normal, but from the 12th to the end of the month, decidedly cold weather for the season prevailed. Moderately heavy rains occurred on the 11th, turning to snow. Snow occurred again on the 17th, 23d, and 28th, and ranged in depth at the end of the month from two to ten inches. Winter grains and grasses were amply protected by the snow, and were reported in good condition.—*W. M. Wilson.*

Wyoming.—Unusually pleasant weather with mild temperatures prevailed over the State during the first and last two weeks of the month. A cold wave on the 17th and 18th was general, but was not severe on stock. Practically all of the precipitation of the month fell during the stormy period from the 7th to the 17th of the month.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

STUDIES ON THE CIRCULATION OF THE ATMOSPHERES OF THE SUN AND OF THE EARTH.

By Prof. FRANK H. BIGELOW.

II.—SYNCHRONISM OF THE VARIATIONS OF THE SOLAR PROMINENCES WITH THE TERRESTRIAL BAROMETRIC PRESSURES AND THE TEMPERATURES.

SEVERAL OPINIONS ON THE SUBJECT OF SYNCHRONISM.

The numerous studies during the past fifty years into the apparent synchronism between the solar variations of energy and the terrestrial effects, as shown in the magnetic field and the meteorological elements, have been on the whole unsatisfactory, if not disappointing. Just enough simultaneous variation has been detected in the atmospheres of the sun and the earth to fascinate the attentive student, if not to justify a large expenditure of labor, in view of the great practical advantages to be obtained in the future as the result of a complete understanding of this cosmical pulsation. The attack upon the problem has really consisted in rather blindly groping for the most sensitive pulse in the entire cosmical circulation, and in disentangling the several interacting types of impulses. It is evident that the partial failures hitherto attending this work have been due to two principal causes: (1) The comparison was made between the changes in the spotted areas of the sun and the terrestrial variations, but these solar changes were not sensitive enough to register a complete account of the action

of the solar output. Discussions of the spots are being replaced by others upon the solar prominences and faculae, which respond much more exactly to the working of the sun's internal circulation. (2) The magnetic and the meteorological observations have not been handled with sufficient precision to do justice to the terrestrial side of the comparison. It is evident that all these physical data at the sun and at the earth must be computed with an exactness comparable to that of astronomical observations of position, if meteorology is to be raised to the rank of a cosmical science. When one considers the crudeness of the meteorological data, taken the world over, due to the character of the instruments employed, the different local hours of observation, and the divergent methods of reduction, it is no wonder that the small solar variations have been swallowed up in the bad workmanship of meteorologists. The prevailing methods have been sufficient for forecasting and for climatological purposes, but they are entirely inadequate for the cosmical problems whose solution will form the basis of scientific long-range forecasts over large areas of the earth, that is, for forecasting the seasonal changes of the weather from year to year. It is perfectly evident that if secular variations of any kind, such as the annual changes in terrestrial pressure, temperature, or magnetic field, are to be attributed to solar action, the original observations must be finally reduced to a homogeneous system. The local peculiarities of each station